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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,564	03/18/2004	Koichi Nishioka	16869G-101700US	7073

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EXAMINER

KLIMOWICZ, WILLIAM JOSEPH

ART UNIT PAPER NUMBER

2627

DATE MAILED: 08/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/804,564

Applicant(s)

NISHIOKA ET AL.

Examiner

William J. Klimowicz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1 and 22 and claim dependent thereon is/are allowed.
- 6) ☒ Claim(s) 2 and 23 (and claims 3, 6-8, 11-13, 16, 24 and 27 as dependent thereon) is/are rejected.
- 7) ☒ Claim(s) See Continuation Sheet is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. ____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Continuation of Disposition of Claims: Claims objected to are 4, 5, 9, 10, 14, 15, 17, 18, 19, 20, 21, , 25, 26, as dependent upon rejected claims 2 and 22.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

Claims are objected to because of the following informalities:

With regard to claims 17-21, the phrases “fixed layer” in each claim (recited twice per claim), should be changed to the phrase --pinned layer-- I order to remain consistent with the preceding claim language.

Appropriate correction is required.

Information Disclosure Statement

The information disclosure statement filed July 1, 2004 lists reference 2 as US Patent No. 5,583,752 (to Sugimoto et al.)

The Applicants' specification at page 1, line 13, lists the prior art document as US patent No. 5,583,725.

It appears that the IDS form 1449 filed by Applicants should indeed list the reference 2 as US patent No. 5,583,725 (to Coffey et al.) since such a patent corresponds to the description of a prior art spin valve sensor, while US Patent No. 5,583,752 (to Sugimoto et al.) is directed to a non-analogous switching power supply and its associated circuitry.

The Examiner has lined through the apparent mistake, and replaced the document (reference 2) with US patent No. 5,583,725 (to Coffey et al.).

The Applicants are required to confirm this in there next reply to this communication.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 2 as well as claims 6, 7, 11, 12 and 16 as dependent upon claim 2, and also claim 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Freitag et al. (US 2003/0179516 A1).

As per claim 2, discloses a magnetoresistive head comprising: a pinned layer (e.g., 402); a free layer (206); and a non-magnetic spacer film (202) formed between the pinned layer (402) and the free layer (206); wherein the pinned layer (402) has a first ferromagnetic film (406) and a second ferromagnetic film (404) anti-ferromagnetically coupled to each other by way of an anti-ferromagnetic coupling film (230); a composition of the first ferromagnetic film (406) is within a range of: $\text{Co}_{100-x}\text{Fe}_x$ (at %) $40 \leq X \leq 80$; and a composition of the second ferromagnetic film (404) is within a range of: $\text{Co}_{100-y}\text{Fe}_y$ (at %) $0 \leq Y \leq 20$ (e.g., see FIG. 12).

As per claim 6, wherein a layer (e.g., 202) in contact with the first ferromagnetic film (406) is formed from one of Ru, Ta, Cu, and NiFeCr.

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As per claims 7 and 11, wherein: the free layer (206) is on the side of a substrate (e.g. G1) and the pinned layer (402) is on a side remote from the substrate (G1) relative to the free layer (206 - see paragraph [0060] for a "top spin valve."; and wherein the magnetoresistive head has an underlayer (SL1-SL3 and/or SL4) adjacent to the free layer (206), the underlayer having an NiFeCr (216) layer on the side of the substrate (G1).

As per claims 12 and 16, wherein: the pinned layer (402) is on the side of the substrate (G1) and the free layer (206) is on a side remote from the substrate (G1) relative to the pinned layer (402); and wherein an underlayer (i.e., a layer which is under) adjacent to a dual spin valve sensor.

As per claim 23, see paragraph [0060], drawn to a dual spin valve sensor, which is set forth in structurally in claim 23.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 8, 13 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freitag et al. (US 2003/0179516 A1).

See the description of Freitag et al. (US 2003/0179516 A1), *supra*.

With regard to claims 3 and 24, although Freitag et al. (US 2003/0179516 A1) does not expressly disclose the anti-ferromagnetic coupling film Ru (230) as having a thickness within a

range from 3.0 to 4.0 Angstroms, Official notice is taken of the fact that it is notoriously old and well known in the magnetoresistive art to routinely modify a thickness of the APC layer in the course of routine optimization/ experimentation and thereby obtain various standard optimized relationships including those set forth in claims 3 and 24.

Given the teachings and suggestions of Freitag et al. (US 2003/0179516 A1) as a whole, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have had the Ru APC layer of Freitag et al. (US 2003/0179516 A1) satisfy the relationships set forth in claims 3 and 24.

The rationale is as follows: one of ordinary skill in the art would have been motivated to have had the Ru APC layer of Freitag et al. (US 2003/0179516 A1) satisfy the relationships set forth in claims 3 and 24 (a thickness of the APC layer as being in a range of 3 to 4 Angstroms) since it is notoriously old and well known in the magnetoresistive art to routinely modify a thickness of the Ru APC coupling film in the course of routine optimization /experimentation and thereby obtain various standard optimized relationships including those set forth in claims 3 and 24. For example, it is well known that by providing a decrease in thickness of the ruthenium APC coupling layer between two ferromagnetic films, the APC coupling force increases providing an advantageous stability in the pinned layer, as a whole..

Moreover, absent a showing of criticality (i.e., unobvious or unexpected results), the relationships set forth in claims 3 and 24 are considered to be within the level of ordinary skill in the art.

Additionally, the law is replete with cases in which when the mere difference between the claimed invention and the prior art is some range, variable or other dimensional limitation within the claims, patentability cannot be found.

It furthermore has been held in such a situation, the Applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Moreover, the instant disclosure does not set forth evidence ascribing unexpected results due to the claimed dimensions. See *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), which held that the dimensional limitations failed to point out a feature which performed and operated any differently from the prior art.

As per claims 8, see claims 7 and 11, *supra*.

As per claim 13, see claims 12 and 16, *supra*.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa et al. (JP 10-223942 A) in view of Heim et al. (US 5,465,185).

As per claim 27, Nakazawa et al. (JP 10-223942 A) discloses a method of manufacturing a magnetoresistive head comprising a pinned layer (12) having a first ferromagnetic film and a second ferromagnetic film anti-ferromagnetically coupled with each other by way of an anti-ferromagnetic coupling film, a free layer (14) and a permanent magnet film (16) disposed at an end of the free layer (14), said method comprising: a first magnetic field ("magnetic field is imparted in a first direction" - e.g., free layer easy axis magnetization direction) application step

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of applying a magnetic field in a desired direction different from a direction of a magnetic moment magnetized to the pinned layer (the easy axis free layer magnetization direction); and a second magnetic field (“magnetic field is impressed in a second direction”)- e.g., fixed layer easy axis magnetization direction) application step of applying a magnetic field in a direction different from the direction of the magnetic field application in the first magnetic field application step.

With regard to claim 27, although Nakazawa et al. (JP 10-223942 A) does not expressly disclose wherein the pinned has two ferromagnetic films coupled antiferromagnetically, such pinning structure used in a head analogous to Nakazawa et al. (JP 10-223942 A) is not only known, but ubiquitous in the art.

As just an example, Heim et al. (US 5,465,185) discloses an analogous spin valve film, wherein the pinned layer is formed of two ferromagnetic films antiferromagnetically coupled.

Heim et al. (US 5,465,185) discloses such an advantage as follows (from the abstract of Heim et al):

Since the pinned ferromagnetic films have their magnetic moments aligned antiparallel with one another, the two moments can be made to essentially cancel one another by making the two ferromagnetic films of substantially the same thickness. As a result, there is essentially no dipole field to adversely affect the free ferromagnetic layer, which improves the sensitivity of the sensor and allows higher recording density to be achieved in a magnetic recording data storage system.

Given the express teachings and motivations, as espoused by Heim et al. (US 5,465,185), it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the pinned layer of Nakazawa et al. (JP 10-223942 A) as including the APC ferromagnetic layers, as taught by Heim et al. (US 5,465,185).

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide the pinned layer of Nakazawa et al. (JP 10-223942 A) as including the APC ferromagnetic layers, as taught by Heim et al. (US 5,465,185) in order to established the express advantages espoused by Heim et al. (US 5,465,185), e.g., as exemplified in the quote of the abstract of Heim et al. (US 5,465,185), *supra*.

Allowable Subject Matter

Claims 4, 5, 9, 10, 14, 15, 17, 18, 19, 20, 21,,25, 26 and 28, as dependent upon rejected claims 2 and 23, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1 and 22 and all claims dependent thereon are currently allowed.

Conclusion

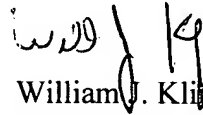
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William J. Klimowicz whose telephone number is (571) 272-7577. The examiner can normally be reached on Monday-Thursday (6:30AM-5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Thi Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


William J. Klimowicz
Primary Examiner
Art Unit 2627

WJK